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REPORT

ON

JOHN REDMOND RESERVOIR

COFFEY AND LYON COUNTIES

KANSAS

EPA REGION VII

WORKING PAPER NO. 515

WITH THE COOPERATION OF THE

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

AND THE

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Kansas State Department of Health and Environment for professional involvement, to the Kansas National Guard for conducting the tributary sampling phase of the Survey, and to those Kansas wastewater treatment plant operators who voluntarily provided effluent samples and flow data.

The staff of the Kansas Division of Environmental Health provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

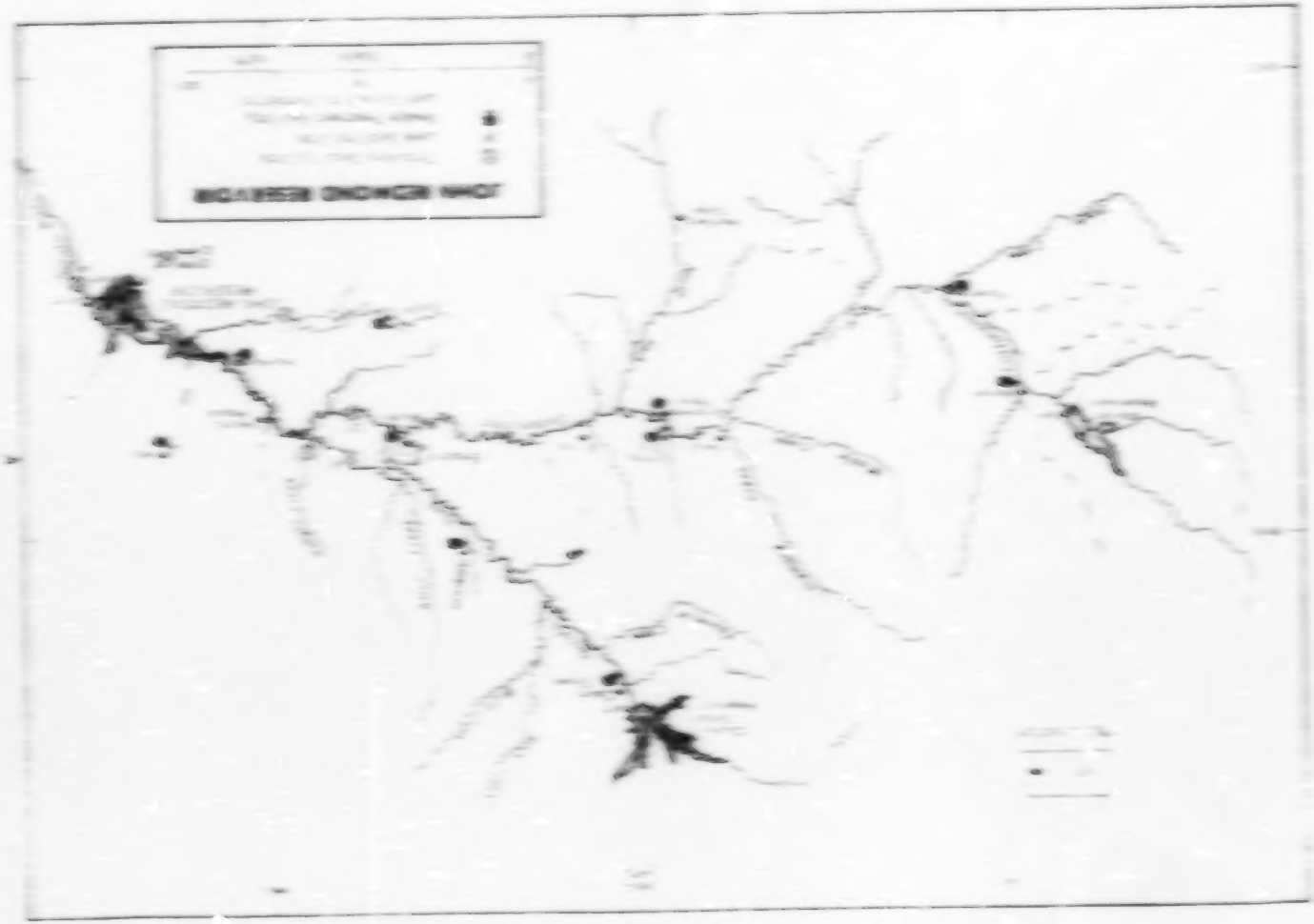
Major General Edward B. Fry, the Adjutant General of Kansas, and Project Officer Colonel Albin L. Lundquist, who directed the volunteer efforts of the Kansas National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY RESERVOIRS

STATE OF KANSAS

NAME	COUNTY
Cedar Bluff	Trego
Council Grove	Morris
Elk City	Montgomery
Fall River	Greenwood
John Redmond	Coffey, Lyon
Kanopolis	Ellsworth
Marion	Marion
Melvern	Osage
Milford	Clay, Geary
Norton	Norton
Perry	Jefferson
Pomona	Osage
Toronto	Greenwood, Woodson
Tuttle Creek	Marshall, Pottawatomie, Riley
Wilson	Russell



JOHN REDMOND RESERVOIR

STORET NO. 7005

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate John Redmond Reservoir is potentially eutrophic. However, because of persistant turbidity and resulting light-limitation, primary productivity is low to moderate (Kring, 1977).

This water body ranked fourteenth in overall trophic quality when the fifteen Kansas reservoirs sampled in 1974 were compared using a combination of six water quality parameters*. Twelve of the reservoirs had less median total phosphorus, 13 had less median dissolved orthophosphorus, 14 had less median inorganic nitrogen, seven had less mean chlorophyll a, and 14 had greater mean Secchi disc transparency.

Survey limnologists did not observe surface concentrations of algae but did note submerged macrophytes along the shoreline at station 2 in October. Due to lack of light penetration (mean Secchi disc depth of about 0.2 meters), productivity was only moderate as indicated by the chlorophyll a levels (page 8) and the low numbers of phytoplankton (page 7).

Previous investigators have noted the high phosphorus concentrations and low zooplankton species diversity which have

* See Appendix A.

been attributed to possible cultural enrichment by upstream sources (Prather and Prophet, 1969; Prophet, Prather, and Edwards, 1970).

B. Rate-Limiting Nutrient:

The algal assay results indicate John Redmond Reservoir was phosphorus limited at the time the sample was collected (10/01/75). The reservoir data indicate phosphorus limitation at all sampling stations and times. However, because of turbidity, primary productivity in the reservoir is light-limited rather than nutrient limited.

C. Nutrient Controllability:

1. Point sources--During the sampling year, point sources contributed 24.2% of the total phosphorus load to John Redmond Reservoir. The wastewater treatment plant at Emporia accounted for 20.9% of this total, and nine other facilities collectively contributed 3.2%.

The present phosphorus loading of 9.20 g/m^2/year is over eight times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 15); however, since primary productivity in the reservoir is light-limited rather than nutrient-limited, point-source phosphorus control would not be expected to result in significant improvement in the condition of the reservoir.

2. Non-point sources--Non-point sources contributed 75.0% of the total phosphorus input. The Cottonwood River contributed 51.2%, the Neosho River contributed 17.3%, Badger Creek contributed 1.1%, and Eagle Creek contributed 1.0%. The ungaged minor tributaries and immediate drainage contributed an estimated 5.0%.

The phosphorus export rates of the tributaries of this reservoir (page 14) were similar to the rates of the tributaries of Council Grove Reservoir* upstream in the Neosho River drainage (60, 41, and 6 kg/km^2/yr) and a tributary of Marion Reservoir** upstream in the Cottonwood River drainage (22 kg/km^2/yr).

* Working Paper No. 516
** Working Paper No. 517

II. RESERVOIR AND DRAINAGE BASIN CHARACTERISTICS[†]

A. Morphometry[††]:

1. Surface area: 38.04 kilometers^2.

2. Mean depth: 2.0 meters.

3. Maximum depth: 7.6 meters.

4. Volume: 76.080 x 10^6 m^3.

5. Mean hydraulic retention time: 23 days (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow da

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Neosho River	2,007.2	9.85
Eagle Creek	142.2	0.96
Cottonwood River	4,043.3	20.65
Badger Creek	72.6	0.50
Minor tributaries & immediate drainage -	706.1	8.43
Totals	7,770.8	40.39**

2. Outlet -

Neosho River	7,808.8***	38.73

C. Precipitation****:

1. Year of sampling: 114.5 centimeters.

2. Mean annual: 93.5 centimeters.

† Table of metric conversions--Appendix B.
†† Stoltenberg, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Sum of inlets adjusted to equal the outlet flow plus evaporation.
*** Includes area of reservoir.
**** See Working Paper No. 175.

III. WATER QUALITY SUMMARY

John Redmond Reservoir was sampled three times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from one or more depths at two stations on the reservoir (see map, page vi). During each visit, a single depth-integrated (near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the last visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll *a* analysis. The maximum depths sampled were 1.5 meters at station 1 and 0.9 meters at station 2.

The sampling results are presented in full in Appendix B and are summarized in the following table.

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[illegible] OF [illegible] AT CHEMICAL [illegible] FOR [illegible]
[illegible] CASE [illegible]

PARAMETER	1ST SAMPLING [illegible] 2 SITES			2ND SAMPLING [illegible] 2 SITES			3RD SAMPLING [illegible] 2 SITES		
	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN
TEMP (C)	11.5 - 17.3	13.4	13.0	23.3 - 25.0	23.3	23.3	15.1 - 15.6	15.4	15.4
[illegible] (MG/L)	4.2 - 6.4	4.1	4.1	5.6 - 5.6	5.6	5.6	4.1 - 4.1	4.2	4.2
[illegible]	241. - 375.	334.	345.	411. - 422.	416.	417.	243. - 333.	294.	314.
PH (STAND UNITS)	6.3 - 6.3	6.7	6.3	6.3 - 6.4	6.3	6.3	7.1 - 7.1	7.1	7.1
TOT ALK (MG/L)	288. - 294.	217.	224.	153. - 163.	158.	160.	154. - 156.	151.	157.
TOT P (MG/L)	0.133 - 0.738	0.334	0.243	0.046 - 0.072	0.032	0.034	0.104 - 0.129	0.117	0.117
[illegible] P (MG/L)	0.243 - 0.869	0.554	0.554	0.067 - 0.137	0.101	0.101	0.053 - 0.057	0.055	0.055
[illegible] (MG/L)	1.133 - 1.751	1.391	1.179	1.428 - 1.621	1.525	1.524	0.749 - 0.724	1.724	0.724
[illegible] (MG/L)	0.865 - 0.233	0.478	0.296	0.058 - 0.078	0.062	0.062	0.258 - 0.264	0.261	0.261
[illegible] N (MG/L)	0.485 - 1.405	1.267	0.484	0.288 - 0.580	0.325	0.324	0.388 - 0.488	0.437	0.438
[illegible] N (MG/L)	0.398 - 1.321	1.253	1.256	0.588 - 0.671	0.637	0.638	0.758 - 0.888	0.773	0.773
TOTAL N (MG/L)	0.883 - 2.401	2.220	1.478	0.758 - 2.125	1.984	1.962	1.025 - 1.293	1.208	1.293
[illegible] (UG/L)	15.7 - 34.1	25.4	25.6	2.6 - 2.9	2.7	2.7	5.8 - 34.2	20.0	20.0
SECCHI (METERS)	8.1 - 8.2	8.2	8.2	8.3 - 8.3	8.2	8.2	8.2 - 8.2	8.2	8.2

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/11/74	1. Stephanodiscus sp.	1,141
	2. Centric diatoms	842
	3. Chroomonas sp.	421
	4. Actinastrum sp.	241
	5. Melosira sp.	180
	Other genera	542
	Total	3,369
06/23/74	1. Melosira sp.	379
	2. Flagellates	169
	3. Stephanodiscus sp.	126
	4. Cyclotella sp.	84
	5. Oscillatoria sp.	84
	Other genera	338
	Total	1,180
10/01/74	1. Stephanodiscus sp.	167
	2. Chroomonas sp.	139
	3. Gloeocystis sp.	139
	4. Cryptomonas sp.	83
	5. Pennate diatoms	56
	Total	584

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (ug/l)
04/11/74	1	16.1
	2	15.2
06/23/74	1	2.6
	2	2.9
10/01/74	1	5.8
	2	14.2

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.010	0.152	12.8
0.050 P	0.060	0.152	18.5
0.050 P + 1.0 N	0.060	1.152	26.2
1.0 N	0.010	1.152	12.2

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of John Redmond Reservoir was high at the time the sample was collected (10/01/75). Also, the significant increase in yield with the addition of phosphorus alone indicates the reservoir was phosphorus limited at that time. Note that the addition of nitrogen alone resulted in a yield not sig-

nificantly different from that of the control.

The reservoir data indicate phosphorus limitation as well. However, because of persistent turbidity, the reservoir is light-limited rather than nutrient-limited (Kring, 1977).

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Kansas National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the months of May, June, and July when two samples were collected. Sampling was begun in October, 1974, and was completed in September, 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Kansas District Office of the U.S. Geological Survey for the tributary sites nearest the reservoir.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the nutrient loads at station C-1, in kg/km^2/year, and multiplying by the ZZ area in km^2.

The operators of the Cottonwood Falls, Emporia, and Strong City wastewater treatment plants provided monthly effluent samples and corresponding flow data. The operators of the wastewater treatment plants at Hartford, Lebo, and Olpe also provided samples; however, corresponding flow data were not available. Nutrient loads from these

* See Working Paper No. 175.

plants and from the wastewater treatment plants at Americus, Council Grove, Florence, and Marion, which were not sampled, were estimated at 1.134 kg P and 3.401 kg N/capita/year; and flows were estimated at 0.3785 m^3/capita/day.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Americus**	345	stab. pond	130.6	Pester Creek
Cottonwood Falls	1,076	stab. pond	378.5	Cottonwood River
Council Grove**	3,000	stab. pond	1,135.5	Neosho River
Emporia***	23,879	tr. filter	21,639.9	Cottonwood River
Florence**	900	stab. pond	340.7	Doyle Creek
Hartford	539	stab. pond	204.0	Neosho River
Lebo	921	stab. pond	348.6	Lebo Creek
Marion**	2,200	stab. pond	832.7	Cottonwood River
Olpe	463	stab. pond	175.2	Eagle Creek
Strong City	626	tr. filter	262.6	Cottonwood River

2. Industrial - Unknown

* Treatment plant questionnaires.
** Anonymous, 1971.
*** More than 25% of the total waste load is from meat packing, chrome plating, creameries, laundries, and a soy-bean mill.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Neosho River	60,615	17.3
Eagle Creek	3,550	1.0
Cottonwood River	179,110	51.2
Badger Creek	3,710	1.1
b. Minor tributaries & immediate drainage (non-point load) -	17,655	5.0
c. Known municipal STP's -		
Americus	390	0.1
Cottonwood Falls	715	0.2
Council Grove	3,400	1.0
Emporia	73,235	20.9
Florence	1,020	0.3
Hartford	810	0.2
Lebo	1,045	0.3
Marion	2,495	0.7
Olpe	525	0.2
Strong City	1,115	0.3
d. Septic tanks - Unknown	?	-
e. Industrial - Unknown	?	-
f. Direct precipitation* -	665	0.2
Total	349,855	100.0

2. Outputs -

Reservoir outlet - Neosho River 199,875

3. Net annual P accumulation - 149,980 kg.

* See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of Total
a. Tributaries (non-point load) -		
Neosho River	833,685	21.3
Eagle Creek	109,935	2.8
Cottonwood River	2,116,525	54.0
Badger Creek	46,185	1.2
b. Minor tributaries & immediate drainage (non-point load) -	545,815	13.9
c. Known municipal STP's -		
Americus	1,175	<0.1
Cottonwood Falls	1,845	<0.1
Council Grove	10,205	0.3
Emporia	195,585	5.0
Florence	3,060	0.1
Hartford	1,835	<0.1
Lebo	3,130	0.1
Marion	7,480	0.2
Olpe	1,575	<0.1
Strong City	3,135	0.1
d. Septic tanks - Unknown	?	-
e. Industrial - Unknown	?	-
f. Direct precipitation* -	41,070	1.0
Total	3,922,240	100.0

2. Outputs -

Reservoir outlet - Neosho River 2,480,455

3. Net annual N accumulation - 1,441,785 kg.

* See Working Paper No. 175.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Neosho River	30	415
Eagle Creek	25	323
Cottonwood River	32	437
Badger Creek	69	641

E. Mean Nutrient Concentrations in Ungaged Stream:

Tributary	Mean Total P Conc. (mg/l)	Mean Total N Conc. (mg/l)
Otter Creek	0.076	1.820

F. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	0.20	3.94	103.1	37.9

Vollenwaider phosphorus loadings
(g/m^2/yr) based on mean depth and mean
hydraulic retention time of John Redmond Reservoir:

"Dangerous" (eutrophic loading)	1.06
"Permissible" (oligotrophic loading)	0.54

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN HAWKINS

LAKE CODE	LAKE NAME	[illegible] TOTAL P	[illegible] INORG N	[illegible] SEC	CHLPA	[illegible]	[illegible] DISS ORTHO P
2601	CEDAR CLIFF RESERVOIR	0.017	0.195	33.457	4.217	18.620	0.024
2602	COUNCIL GROVE	0.069	0.138	65.889	9.789	18.403	0.023
2603	ELK CITY	0.038	0.578	98.488	3.212	14.389	0.013
2604	FALL RIVER RESERVOIR	0.053	0.478	85.567	7.683	9.238	0.016
2605	JOHN REDMOND RESERVOIR	0.118	1.258	92.667	9.467	9.259	0.090
2606	KANOPOLIS RESERVOIR	0.056	0.648	87.898	16.833	18.285	0.011
2607	KIPAHA RESERVOIR	0.052	0.438	83.667	12.488	9.836	0.011
2608	KILLEEN RESERVOIR	0.034	0.245	95.111	18.408	14.433	0.007
2609	KILFORD RESERVOIR	0.079	0.718	88.333	18.88[illegible]	12.838	0.030
2610	KOPTON RESERVOIR	0.122	0.118	78.758	23.368	9.887	0.032
2611	PERRY RESERVOIR	0.055	0.478	78.571	5.614	13.438	0.017
2612	POMONA RESERVOIR	0.048	1.240	81.333	8.312	13.388	0.021
2613	TORONTO RESERVOIR	0.067	0.425	88.588	6.583	13.888	0.011
2614	TUTTLE CREEK RESERVOIR	0.092	0.478	78.667	11.278	13.838	0.067
2615	WILSON RESERVOIR	0.023	0.296	86.222	8.867	13.468	0.034

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]

| | | |

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

[illegible]

APPENDIX D

PHYSICAL and CHEMICAL DATA

[illegible]

[illegible]

[illegible]

APPENDIX C

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

[illegible]

[illegible]

[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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7/12/12	20	40	0.79	1.39	1.39	0.65	0.73
7/12/12	13	35	0.66	1.88	0.25	0.89	0.73
7/12/15	14	35	0.72	1.78	1.29	0.84	0.46
7/13/14	18	19	0.84	1.88	0.12	0.82	1.26
7/13/16	15	24	0.75	1.46	0.78	1.26	0.72
7/13/17	14	44	0.67	1.79	0.74	0.88	0.94
7/13/18	14	47	0.73	0.48	0.03	1.25	0.84
7/14/11	19	18	0.35	2.16	0.25	0.84	0.03
7/14/14	15	62	0.83	1.26	1.03	0.67	0.26
7/14/15	14	37	0.67	1.88	0.82	1.08	0.26
7/14/18	28	19	0.67	0.76	1.03	0.45	0.25
7/14/19	19	49	0.63	0.78	1.25	0.84	1.23
7/14/21	12	15	0.29	1.86	0.25	0.25	0.88
7/14/23	12	15	0.37	1.48	1.26	0.94	0.26

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04/18/13	09	58	0.394	5.598	1.726	0.175	0.778
04/11/18	15	38	0.648	1.486	5.476	0.125	0.258
04/12/15	11	14	0.552	1.488	1.736	1.878	0.340
05/01/12	14	31	0.484	5.387	0.911	0.855	0.248
05/02/04	11	24	0.936	2.288	1.549	0.117	0.388
05/03/24	16	01	0.875	2.281	1.384	0.145	0.280
05/04/13	09	54	0.496	2.258	4.238	1.174	0.387
05/05/10	15	45	0.765	1.586	0.483	0.125	0.245
05/05/31	17	25	1.958	3.286	0.895	0.188	0.738
05/06/14	10	09	1.288	2.388	0.118	0.115	0.586
05/06/24	15	36	1.388	1.958	0.346	0.135	0.529
05/07/16	21	39	0.488	1.358	0.254	0.129	1.298
05/07/29	10	45	0.875	1.458	0.558	0.148	0.323
05/08/18	14	05	0.389	3.758	0.786	0.398	0.486
05/09/13	14	05	1.775	3.488	1.198	0.258	0.548

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75/03/02	12	00							
DAILY-			0.00	24.00	10.00	7.65	10.50	4.30	4.60
75/03/03	12	00							
75/04/02	12	00							
DAILY-			0.25	42.00	28.50	3.13	13.00	5.05	4.50
75/04/02	17	07							
75/05/19	01	22							
DAILY-			0.20	27.00	24.50	7.40	7.70	7.40	7.10
75/05/19	24	00							
75/05/20	24	00							
DAILY-			0.00	25.00	24.50	7.02	7.30	6.50	7.00
75/05/21	24	00							
75/06/06	24	00							
DAILY-			1.00	23.00	22.50	7.39	6.60	6.30	6.10
75/06/07	24	00							
75/07/04	12	00							
DAILY-			0.25	25.00	6.00	7.70	6.00	6.50	6.20
75/07/04	12	00							
75/07/25	24	00							
DAILY-			2.50	24.50	4.00	7.40	6.05	5.00	5.50
75/07/26	24	00							
75/08/10	24	00							
DAILY-			3.00	23.00	7.00	6.80	6.30	6.05	6.05
75/08/11	24	00							
75/09/08	12	00							
DAILY-			0.25	25.00	18.50	7.00	6.30	6.05	6.00
75/09/11	12	00							
75/10/02	12	00							
DAILY-			0.25	22.00	7.00	6.50	6.00	5.00	5.25
75/10/03	12	00							
75/10/21	24	00	0.00	24.00	6.00	6.40	6.00	6.30	6.00
75/10/23	12	00							
DAILY-			3.00	24.00	24.50	7.00	6.00	7.00	6.50
75/10/23	24	00							

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